

U.S.S.N. 10/707,292

5

26475 (GEMS 0186 PA)

REMARKS

In the Office Action dated October 8, 2004, claims 1-23 are pending. Claims 4-23 are allowed. Of the remaining claims 1-3, claim 1 is an independent claim from which claims 2-3 depend therefrom. Claims 1-3 have been amended. Note that claims 1-3 have not been amended for patentability reasons, but rather for clarification reasons.

The drawings are objected to because figure lines and numbering in many cases are unreadable. A corrected set of drawings is submitted herewith.

Figure 10 of the drawings is objected to for missing a legend, such as -- Prior Art--. The Office Action states that the legend is necessary because only that which is old is illustrated. The Applicant, respectfully, traverses. The Applicant submits that Figure 10 is a plot of magnetization components as a function of precession angle, as a result of the preparation phase of Figure 8. The preparation phase of Figure 8 illustrates excitation flip angles in accordance with an embodiment of the present invention. Figure 10 illustrates the effects of imposing excitation flip angles in accordance with the present invention. Figure 10 provides an illustrated example result of the present invention that may be compared with the plot of Figure 6, which is prior art and has a legend stating such. Thus, the Applicant submits that Figure 10 is not missing nor does it require a legend as suggested since it does not contain only old material.

Claims 1-3 stand rejected 35 U.S.C. 102(b) as being anticipated by Hardy et al. (USPN 4,695,799). Claims 1-3 have been amended to clarify what is meant by the term "adiabatically conditioning." The Applicant submits that claims 1-3 as amended are in a condition for allowance in view of Hardy, since Hardy fails to teach or suggest the apodization of magnetization flip angles.

Amended claim 1 recites a method of excitation for use during an NMR examination. The method includes adiabatically conditioning a portion of a body with a progression of radio frequency pulses via a dampening by apodization of magnetization flip angles in preparation for NMR measurement. In so doing, the claimed invention causes the transversal component M_T of the magnetization to be at a null when the magnetization approaches a direction of equilibrium, such as the steady-state magnetization M_{ss} . This is stated in paragraphs [0052] and [0053] of the present application. By performing the adiabatic conditioning as stated, the number of RF pulses applied and the time to attain a magnetization equilibrium is minimized before the performance of a series of excitation-measurement sequences. Figure 10 of the present application illustrates the transversal component without oscillation as a function of frequency, which allows for magnetization equilibrium, as compared to the perpendicular component 72 of Figure 6, which contains lobes 74.

Hardy performs an NMR magnetization inversion by non-linear adiabatic fast passage or a non-linear, tangential frequency sweep. Hardy adds an oscillating signal F_k with a ramp signal F'_{RF} to form an excitation signal F_{RF} . The frequency of the oscillating signal F_k is varied at lower and greater rates of change relative to a ramp, as shown in Figures 2a and 3a of Hardy.

Hardy performs a non-linear, tangential frequency sweep to essentially provide a complete magnetization inversion in an inversion time interval that is required for a 180° RF π -pulse magnetization inversion with less sensitivity to inhomogeneities in the main magnetic field. On the other hand, the claimed invention performs an apodization of magnetization flip angles to reduce the time to attain magnetization equilibrium such that valuable data may be collected in an NMR measurement. Frequency adjustment of excitation signals is clearly different than the apodization of magnetization flip angles.

U.S.S.N. 10/707,292

7

26475 (GEMS 0186 PA)

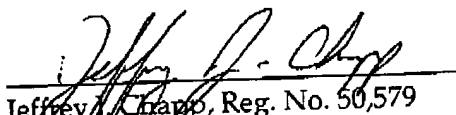
Applicant submits that Hardy does not disclose the apodization of magnetization flip angles in preparation for NMR measurement. Nowhere in Hardy are flip angles discussed. Also, nowhere in Hardy is the reduction of a magnetization transversal component MT to a small or null state disclosed.

In order for a reference to anticipate a claim the reference must teach or suggest each and every element of that claim, see MPEP 2131 and *Verdegrad Bros. V. Union Oil Co. of California*, 814 F.2d 628. Thus, since each and every element of claim 1 is not taught or suggested by Hardy, Applicant submits that claim 1 is novel, nonobvious, and is in a condition for allowance. Also, since claims 2 and 3 depend from claim 1, they are also novel, nonobvious, and are in a condition for allowance.

In light of the amendments and remarks, Applicant submits that all of the objections and rejections are now overcome. The Applicant has added no new matter to the application by these amendments. The application is now in condition for allowance and expeditious notice thereof is earnestly solicited. Should the Examiner have any questions or comments, he is respectfully requested to call the undersigned attorney.

Respectfully submitted,

ARTZ & ARTZ P.C.


Jeffrey J. Chapp, Reg. No. 50,579
28333 Telegraph Road, Suite 250
Southfield, MI 48034
(248) 223-9500

Dated: January 7, 2005